

# TOPICALITIES

*Edited by Markéta Držková*

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# News & more

## A yearly update on ISO standards for graphic technology

This time, the regular overview of the standards developed under the direct responsibility of the technical committee ISO/TC 130 is somewhat longer than usual; therefore, 14 standards that remain current based on the systematic review are listed in the side column. At present, 15 standards are under development. These include four new documents, two of which were registered in 2023. One deals with image technology colour management based on ICC.1:2022, and the other with measurement and one-parameter representation of translucency. The remaining 11 documents revise or build on existing standards, in one case on the withdrawn publicly available specification ISO/PAS 15339-1:2015 defining the principles of printing from digital data across multiple technologies. Seven documents published during the past 12 months are presented below.

### ISO 2834-2:2022

#### Graphic technology – Laboratory preparation of test prints Part 2: Liquid printing inks

Two years after the revision of Part 1, which is dedicated to paste inks, see JPMTR Vol. 10, No. 3 (2021), the technically revised third edition of this part, which specifies a method for preparation of test prints produced with liquid printing inks as used in gravure and flexography, but not inkjet printing, is also available; it was published in December 2022 and replaced the second edition from 2015, see also JPMTR Vol. 4, No. 3 (2015). The test prints of water-based, solvent-based or radiation-cured inks are intended for reflection measurements and testing of light fastness and mechanical and chemical resistance. In the current version, the ink transfer data of particular settings of laboratory proofer, printing forme, ink and substrate need to be acquired.

### ISO 5776:2022

#### Graphic technology – Symbols for text proof correction

After the more substantial changes introduced in the previous edition of this standard in 2016, extending its applicability to any orthography and adding several new symbols, see JPMTR Vol. 5, No. 3 (2016), its current third edition from December 2022 adds correction symbols in the Korean language and the corresponding alphabetic and syllabary examples in an annex.

### ISO/TS 18621-21:2023

#### Graphic technology – Image quality evaluation methods for printed matter

#### Part 21: Measurement of 1D distortions of macroscopic uniformity utilizing scanning spectrophotometers

This second edition, published in March 2023, brings formulae corrections and bibliography updates to a recent standard that specifies a method quantifying the non-uniformity of toner-based or inkjet digital prints due to banding or streakiness oriented in the horizontal and vertical direction by a Macro-Uniformity-Score on a scale from 100 to 0 (decreasing uniformity), see also JPMTR Vol. 10, No. 3 (2021).

## The ISO standards for graphic technology confirmed for the next period

The standards confirmed for the first time include ISO 2846-1:2017 Graphic technology – Colour and transparency of printing ink sets for four-colour printing – Part 1: Sheet-fed and heat-set web offset lithographic printing, ISO 12634:2017 Graphic technology – Determination of tack of paste inks and vehicles by a rotary tackmeter, ISO 13655:2017 Graphic technology – Spectral measurement and colorimetric computation for graphic arts images, ISO 16613-1:2017 Graphic technology – Variable content replacement – Part 1: Using PDF/X for variable content replacement (PDF/VCR-1), ISO 17972-3:2017 Graphic technology – Colour data exchange format (CxF/X) – Part 3: Output target data (CxF/X-3), and ISO 20654:2017 Graphic technology – Measurement and calculation of spot colour tone value, all presented in JPMTR Vol. 6, No. 3 (2017).

Further standards that were reviewed and confirmed are ISO 12636:2018 Graphic technology – Blankets for offset printing, ISO 17972-4:2018 Graphic technology – Colour data exchange format (CxF/X) – Part 4: Spot colour characterisation data (CxF/X-4) and ISO 20690:2018 Graphic technology – Determination of the operating power consumption of digital printing devices, see JPMTR Vol. 7, No. 3 (2018), and also one more recent document, namely ISO/TS 23564:2020 Image technology colour management – Evaluating colour transform accuracy in ICC profiles, presented in JPMTR Vol. 9, No. 3 (2020).

The last group consists of four reconfirmed standards. All were published about two decades ago and have been confirmed for the fourth time. Three of them specify data formats for exchange in a prepress stage. The oldest is ISO 15930-3:2002

Graphic technology – Prepress digital data exchange – Use of PDF – Part 3: Complete exchange suitable for colour-managed workflows (PDF/X-3). Among all current PDF/X options, this one is probably the least used but still supported. The other two are ISO 12639:2004 Graphic technology – Prepress digital data exchange – Tag image file format for image technology (TIFF/IT), including Amendment 1: Use of JBIG2-Amd2 compression in TIFF/IT, which was added in 2007, and ISO 12640-2:2004 Graphic technology – Prepress digital data exchange – Part 2: XYZ/sRGB encoded standard colour image data (XYZ/SCID) with Technical Corrigendum 1 published in 2008, which specified the special profile intended for interpretation of the D65 channel scaled XYZ image files of this part of ISO 12640 because D65 CIEXYZ profiles normally used otherwise would produce incorrect results. The last recently reconfirmed standard is ISO 15790:2004 Graphic technology and photography – Certified reference materials for reflection and transmission metrology – Documentation and procedures for use, including determination of combined standard uncertainty, which provides guidance to manufacturers and users of certified reference materials, especially within quality management systems as defined in ISO 9001.

### The first certification according to PSD Colour Data

At present, Fogra offers seven digital printing certifications within its standardised FograCert test programme. The PSD Colour Data verifies the colour accuracy of a print job in line with the tolerances specified in the ProcessStandard Digital based on the Fogra MediaWedge measurement data. In May, the first PSD Colour Data certification for seven-colour printing was achieved by Landa Digital Printing on the Landa S10 press, meeting the FOGRA55 printing condition. Till now (September 2023), it is still the only one listed among the certified print service providers.



### ISO 22067-1:2022

#### Graphic technology – Requirements for communication of environmental aspects of printed products

##### Part 1: General printing

This new standard was published in October 2022. The specified requirements and criteria should help effectively communicate environmental aspects and impacts of production processes and materials used within print production supply chains among material suppliers, printers, print buyers, consumers and recyclers or re-users of printed materials. The typical elements considered include paper, board, plastic and composite substrates, printing inks and varnishes, printing plates, offset blankets and other print substrates, components and consumables used during prepress and press stages when creating printing formes, preparing press, printing and cleaning. Printing on textiles and ceramics is not included; also, print finishing, converting, or other post-print processing are out of scope. This document, as such, does not provide a labelling system but has been developed in harmony with the ISO 14020 series – Environmental labels and declarations.

The standard defines general principles and describes criteria and parameters for materials and consumables data collection, supplier requirements, print production and printing methods, suppliers and third-party services, record keeping and assessment, exclusions, chemicals and materials, emissions to air and water, energy management and recovery, carbon dioxide emissions in general and in terms of raw materials procurement and printing process, waste and recycle or reuse. Finally, it specifies requirements for the environmental statement. The annexes list environmentally hazardous substances to be communicated, high-risk environmentally hazardous substances, volatile organic compounds, examples of laws related to water pollution, waste regulations and sample statements.

### ISO 23498:2022

#### Graphic technology – Visual opacity of printed white ink

The original edition of this standard applicable to printing opaque white ink was published three years ago, see also JPMTR Vol. 9, No. 3 (2020). The main change in this second edition is the corrected formula in its annex.

### ISO 24585-1:2023 and ISO 24585-2:2023

#### Graphic technology – Multispectral imaging measurement and colorimetric computation for graphic arts and industrial application

##### Part 1: Parameters and measurement methods

##### Part 2: Requirements for decorative surfaces

This new series deals with multispectral image capture of surfaces with spatially varying colour, which is based on sampling a contiguous band of wavelengths across the visible range, in some cases extending into the infrared or ultraviolet, and reflects the restrictions of current multispectral imaging technologies in terms of the number of spectral image channels. The first two parts were published this year in July and September, respectively. Part 1 defines the requirements for the spatially resolved spectral measurement of reflecting flat objects, computation of colorimetric parameters and comparison of multispectral images, as well as derived tristimulus images. It does not cover transmitting or self-illuminating objects and prints on a metallic or interference foil. Part 2 specifies the corresponding experimental parameters relevant to decorative lamination and introduces the image similarity index. It is not applicable to functional surfaces.

# Bookshelf

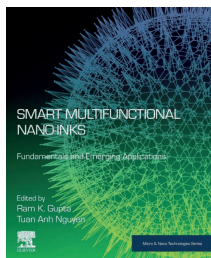
## Smart Multifunctional Nano-inks Fundamentals and Emerging Applications

This volume was contributed by over 70 experts from across the globe and covers the major types of nanomaterials used in smart inks for various applications in printed electronics and security printing. Also, it discusses the approaches based on theoretical modelling, optimised synthesis and suitable functionalisation, helping to address the issues of upscaling the production and properties of nano-inks towards their industrial use, as well as the open challenges.

The content consists of 27 chapters organised into six sections. In the first one, three chapters introduce the metal-based conductive nano-inks together with techniques for their synthesis and characterisation; the other three present aerosol-jet printing of a wide range of materials on 2D or 3D free-form substrates, 3D printing of 2D nano-inks and reactive inks, and the last chapter reviews the current knowledge on a toxicity and exposure assessment of metal, metal oxide and polymer nanoparticles.

The following parts deal with the nano-inks for the main application areas. For electronic industries, this includes the inks based on graphene, carbon nano-dots, metal oxides and solution-processed 2D nanomaterials from graphene and its derivatives to hexagonal boron nitride, black phosphorene, transition metal dichalcogenides and early-transition metal nitrides or carbides, i.e. MXenes. Regarding energy generation, the chapters cover the nano-inks for fuel and solar cells, including polymer-based inks and 3D-printable nanomaterials for flexible solar cell applications. For energy storage, the focus is on nano-ink formulations for printed supercapacitors, including polymeric inks and inks based on MXenes. Another area of interest is biomedical applications, presented in the fifth section. These include the nano-inks for tissue engineering, where nanocomposite inks are especially promising for producing complex biofunctional and stimuli-responsive environments. Also, the ink formulation for printed biosensors, mainly the optical and electrochemical ones, is discussed together with the key properties of printed layers and the performance of state-of-the-art devices. Further, one chapter reviews the emerging research on synthesis, stabilisation and studies of metallic nanostructures with unique optical properties for a range of possible applications, such as chemical and biological sensing, nonlinear optics, waveguiding, metamaterials and photothermal ablation of cancerous cells. Finally, 3D-printable nanocomposite biomaterials for bone scaffolds and grafts.

The last section is dedicated to the other applications of nano-inks. Besides one chapter dealing again with nano-inks basics and energy storage applications, the topics include novel photoactive inkjet-printable nanomaterials for solar water splitting, nano-inks for security and defence applications, and – last but not least – for food packaging.



*Editors: Ram K. Gupta, Tuan A. Nguyen*

Publisher: Elsevier  
1<sup>st</sup> ed., October 2022  
ISBN: 978-0-323-91145-0  
726 pages  
Softcover  
Available also as an eBook





### Intelligent Manufacturing Management Systems Operational Applications of Evolutionary Digital Technologies in Mechanical and Industrial Engineering

*Editors: Kamalakanta Muduli,  
Venkata P. Kommula, Devendra K. Yadav,  
M. C. Pon Selvan, Jayakrishna Kandasamy*

Publisher: Wiley-Scrivener  
1<sup>st</sup> ed., May 2023  
ISBN: 978-1119836247  
400 pages  
Hardcover  
Also as an eBook



This book presents the approaches towards the fast and effective management, analysis and utilisation of vast amounts of a variety of data that can be collected by internet-based technologies using artificial intelligence solutions applicable in the industry. It covers the main aspects of smart manufacturing and available technologies and systems for smart design, machining, monitoring, control and scheduling, including automation, robots, 3D printing, industrial Internet of Things, smart vision-based sensing, augmented and virtual reality, digital twins, simulation, big-data analytics, cloud computing, deep learning, and other concepts. Besides opportunities, the book also identifies challenges, such as cyber-security issues, and discusses practical considerations for integrating digital technologies into operations and optimising their performance, with example case studies in different areas,

### Customized Production Through 3D Printing in Cloud Manufacturing

*Authors: Lin Zhang,  
Longfei Zhou, Luo Xiao*

Publisher: Elsevier  
1<sup>st</sup> ed., November 2022  
ISBN: 978-0128235010  
212 pages  
Softcover  
Also as an eBook

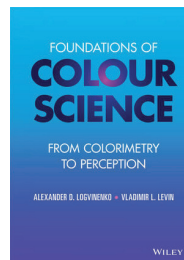


The Industry 4.0 framework made it possible to advance the idea of

### Foundations of Colour Science From Colorimetry to Perception

As explained by A. Logvinenko in the preface, “much of the book is devoted to various mathematical problems arising in colour science, and their solving”, which was motivated by realising the need to revise Grassmann’s laws and take into account the inherent fuzziness of human responses.

The book begins with the outline introducing the individual colour-related concepts and referring to the literature as well as the parts of the book where they are treated. The chapters dealing with light colour discuss the colour stimulus space and colour mechanisms, identification of Grassmann structures based on metameric matching, colour-signal cone, colour stimulus manifold, light metamerism and light metamer mismatching, light-colour perception, its typology and inter-individual differences, colour matching structures and matching metamerism, identification of Grassmann structures induced by colour matching structures, identification of indiscriminate relations, colour detection and discrimination, and colour mechanisms in the eye and the brain. The chapters in the next part are dedicated to object colour, covering the object-colour solid including the trichromatic regular one, object-colour stimulus manifold, object-colour perception in a single-illuminant scene with object metamer mismatching, object-colour perception in a multiple-illuminant scene and object-colour indeterminacy. The last chapter before the epilogue outlines an alternative approach to perception.



*Authors: Alexander D. Logvinenko, Vladimir L. Levin*

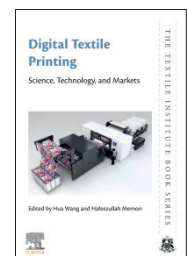
Publisher: Wiley  
1<sup>st</sup> ed., September 2022  
ISBN: 978-1-119-88591-7  
560 pages  
Hardcover  
Available also as an eBook

### Digital Textile Printing Science, Technology and Markets

This new volume in The Textile Institute Book Series is dedicated to digital textile printing, which is seen as a key technology for the development of the world’s textile printing and dyeing industry thanks to its significant benefits in terms of process speed and simplicity, design possibilities and personalisation, at the same time reducing costs and waste. All of that fosters innovations in production methods and business models. The book intends to bring an up-to-date overview of all related aspects. It covers digital printing technology, mechanisms and materials, digital textile printing machines,

*Editors: Hua Wang, Hafeezullah Memon*

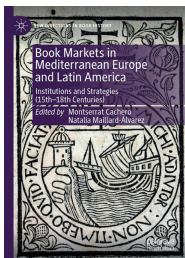
Publisher: Woodhead Publishing  
1<sup>st</sup> ed., June 2023  
ISBN: 978-0-443-15414-0  
306 pages  
Softcover  
Available also as an eBook



colour management, management and software for textiles, digital image design and printing, developments in pretreatment processes for various types of fabrics, including the low-temperature plasma surface modification, and classes and properties of colourants and inks. Further, it discusses the technological barriers to digital printing in textiles, quality of digital textile printing, Western market overview and emerging market trends, digital textile printing innovations and the future outlook.

### Book Markets in Mediterranean Europe and Latin America Institutions and Strategies (15th–18th Centuries)

Part of the New Directions in Book History series, this book explores how books were produced, distributed and controlled in the two geographical areas that were strongly connected in the given period. The topic is treated from economic and cultural perspectives, drawing on religious, commercial and legal archive documents, including notary and court records. The text discusses the circulation of books, the role of book privileges in trade protection and promotion as well as content regulation, the use of publishing revenues by hospitals and orphanages across the Spanish Empire, the printing privilege of calendars in Castile, the Giunta publishers serving both Catholic and academic institutions, global networks in the Atlantic book market, the role of booksellers in knowledge circulation within the Portuguese Empire, publication and distribution of liturgical books in Spain, the struggles for influence between the Roman Catholic Church and the Ecumenical Patriarchate, and the regional differences in inquisitorial book control.



*Editors: Montserrat Cacheró, Natalia Maillard-Álvarez*

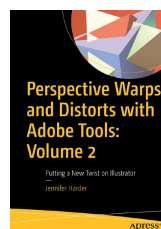
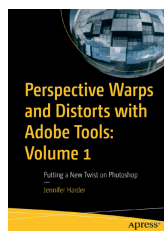
Publisher: Palgrave Macmillan  
1<sup>st</sup> ed., January 2023  
ISBN: 978-3-031-13267-4  
268 pages  
Hardcover  
Available also as an eBook

### Perspective Warps and Distorts with Adobe Tools Volume 1: Putting a New Twist on Photoshop Volume 2: Putting a New Twist on Illustrator

These two volumes present and explain the traditional as well as recently added advanced tools and filters available in Adobe Photoshop and Illustrator. The author demonstrates their use for correcting or creating distortion and other effects in raster images, text and vector graphics, including smart objects, content-aware scaling, 3D non-destructive effects and more.

*Author: Jennifer Harder*

Publisher: Apress  
1<sup>st</sup> ed., December 2022  
ISBN: 978-1-4842-8709-5 &  
978-1-4842-8828-3  
1 042 & 1 131 pages, 1 631 & 1 790 images  
Softcover  
Available also as an eBook



cost-effective customisation enabled by 3D printing and cloud solutions beyond small-scale studies. In this book, the authors share experience and insight in this field gained during the research and development of the cloud manufacturing platform. They present the advances in cloud manufacturing, the cloud 3D printing platform architecture, 3D model design methods, considerations for remote access to 3D printers and 3D printing process monitoring. Further, they discuss credibility evaluation, supply-demand matching, task scheduling, effective process management, security and privacy.

### The Package Design Book Volume 2

*Editor: Julius Wiedemann*



Publisher: Taschen  
1<sup>st</sup> ed., March 2023  
ISBN: 978-3836590990  
640 pages  
Hardcover

As a highly competitive area, packaging design naturally exploits all kinds of innovative technologies. Since 2007, the excellent works have been recognised in a global Pentawards annual competition. This volume presents its winners from the past decade (the first one compiled Pentawards winners from 2008 to 2016), helping to track the evolution in the field, including new materials and emphasis on sustainability.

### Logo Beginnings

*Author: Jens Müller*



Publisher: Taschen  
1<sup>st</sup> ed., January 2022  
ISBN: 978-3836582285  
432 pages  
Hardcover

Complementing his Logo Modernism from 2015, J. Müller in this book explores and illustrates the origins of logo design based on archival materials from 1870 to 1940.

### Recent Advances in Smart Self-Healing Polymers and Composites

Editors: Guoqiang Li, Xiaming Feng

Publisher:  
Woodhead Publishing  
2<sup>nd</sup> ed., June 2022  
ISBN: 978-0128234723  
528 pages, Softcover  
Also as an eBook



The second edition of this volume was revised and expanded to reflect the progress and new developments in the area of self-healing materials since its original publication in 2015, including their 3D and 4D printing. It brings an overview of crack self-healing, healing efficiency evaluation and modelling, the solid-state healing of polymer resins and composites and self-healing based on capsules, microvascular systems, reversible chemical bonds and supramolecular networks. Further, it describes self-healing coatings and elastomers, self-healing composites based on shape memory polymers or with embedded shape memory polymer fibres and polymeric artificial muscle wires. Finally, the book deals with additive manufacturing of self-healing materials and recyclable multifunctional thermoset polymers with self-healing ability.

### Biobased Adhesives Sources, Characteristics, and Applications

Editors: Manfred Dunky, K. L. Mittal

Publisher:  
Wiley-Scrivener  
1<sup>st</sup> ed., May 2023  
ISBN: 978-1394174638  
768 pages, Hardcover  
Also as an eBook



This new volume presents a comprehensive reference of biobased adhesives, reflecting their growing importance and use. The content is organised into three parts; the first deals with fundamental aspects of adhesives based on natural resources, and the other two detail their classes and a wide range of applications.

### Solution-Processed Organic Light-Emitting Devices

This new book reviews the state-of-the-art technologies for low-cost, large-area organic light-emitting devices. It presents and compares the solution-processable materials and promising technologies for their deposition, as well as the related challenges and their possible solutions. After introducing the fundamental background in terms of luminescent materials, device structures, working principles and manufacturing technologies, four chapters deal with the fabrication of organic light-emitting devices by spin-coating, roll-to-roll processing using various printing and coating technologies, inkjet printing, including a description of phosphorescent and thermally activated delayed fluorescent materials and industrial research progress, and a novel approach based on transfer printing, which significantly reduces the demands on materials and device design. The next chapter is dedicated to organic electrodes, including interfacial engineering approaches to achieve desirable properties. Then, six chapters review solution-processable hole-transporting, electron-transporting, host and light-emitting materials, where oligonuclear complex emitters, dendrimeric emitters and polymeric emitters are detailed. Further, electropolymerised organic light-emitting diodes and solution-processable organic lasers are presented. The last chapter concludes with emerging solution processes and an outlook.

Editor: Guohua Xie

Publisher: Woodhead Publishing  
1<sup>st</sup> ed., August 2023  
ISBN: 978-0-323-95146-3  
570 pages  
Softcover  
Available also as an eBook

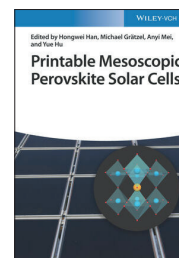


### Printable Mesoscopic Perovskite Solar Cells

Contributed by leading scholars in the field, this new book provides a comprehensive insight into the current knowledge of printable mesoscopic perovskite solar cells. The opening chapter introduces the principle and typical structures of perovskite solar cells. The following two describe the methods and technologies used for characterising halide perovskite materials and devices and their solution-based processing, including various coating and printing technologies. Then, three chapters deal with mesoscopic anodes and cathodes, insulating layers and perovskite materials, particularly their types, synthesis and engineering. The remaining four chapters discuss the efficiency progress in printable mesoscopic perovskite solar cells, stability issues and solutions, considerations for manufacture and module design, example applications and strategies towards commercialisation.

Editors: Hongwei Han, Michael Grätzel, Anyi Mei, Yue Hu

Publisher: Wiley-VCH  
1<sup>st</sup> ed., June 2023  
ISBN: 978-3-527-34958-6  
304 pages  
Hardcover  
Available also as an eBook





# Bookshelf

## Academic dissertations

### Image-Based Rendering of Real Environments for Virtual Reality

This thesis contributes to developing approaches providing immersive virtual reality experiences in 360° real-world environments beyond omnidirectional stereo solutions, which can find use in various applications. The main focus was on 3D photographs, i.e. image-based scene representations with translational action spaces. The work presents novel end-to-end image-based rendering pipelines and an enhanced neural method. Input for all methods can be captured with a hand-held camera, and the time to visual feedback is short.

The introduction defines the scope and the terms virtual reality, degrees of freedom and 3D photography as used in the context of the work. The extensive second chapter provides relevant background and explains the related concepts. It specifies the assumptions made and covers the coordinate systems, pinhole camera model, camera pairs, 3D scene reconstruction and image-based rendering, including the methods utilising machine learning. Also, it reviews the research on real-world virtual reality and compares the published methods. Then, four chapters present and discuss the individual proposed approaches. The one producing depth-augmented stereo panoramas from the omnidirectional stereo panorama pair (ODS2DASP) comprises capturing the input images for reconstructing a point cloud through triangulation of the corresponding features in them and then representing and rendering the scene geometry. In the case of MegaParallax, i.e. the casual 360° panoramas with motion parallax, preprocessing of the captured video includes reconstructing camera geometry, registering cameras to the trajectory, sampling and computing bidirectional optical flow between neighbouring viewpoints. For rendering, novel-view synthesis from two cameras is described. The OmniPhotos pipeline differs by beginning with the casual capture of 360° photographs and reconstructing a scene-adaptive deformable proxy fitting alleviating vertical distortion. Finally, the extensions improving the quality of extrapolated viewpoints when using the deferred neural rendering (DNR4VE) are presented.

### Method for Analyzing Droplet Positioning in Inkjet Printing

The aim of this thesis was to increase the inkjet print quality and its consistency by reducing the number of visible defects by analysing and controlling droplet placement with a considerably increased frequency of measurement and thus reduced waste. The approach employs small test patterns, a camera-based inspection system and a simulation model of image acquisition to enable inspection of all print nozzles during production printing without the need for special sorting in the post-processing stage. In addition to colour printing, the inspection of transparent primer is possible as well.

First, the dissertation describes the fundamentals of inkjet technology, industrial cameras and their use in inspection systems, including an overview of commercially available systems, their implementation in printing machines and the characteristics evaluated from special test patterns. Further, the limitations of current systems are identified. One chapter details the experimental setups, materials and methods. The following four chapters present the main areas of the work. For the developed simulation model,

Doctoral thesis – Summary

Author:

*Tobias Bertel*

Speciality field:

*Computer Science*

Supervisors:

*Christian Richardt*

*Neill Campbell*

*Darren Cosker*

Degree conferral:

*14 February 2022, University of Bath,  
Department of Computer Science  
Bath, United Kingdom*

Contact:

*[https://www.linkedin.com/in/  
tobias-bertel-31b256182](https://www.linkedin.com/in/tobias-bertel-31b256182)*

Further reading:

*EThOS ID: [uk.bl.ethos.852336](https://www.eprints.org/ethos/uk.bl.ethos.852336)  
<https://github.com/cr333/OmniPhotos>*

Doctoral thesis – Summary

Author:

*Claus Schneider*

Speciality field:

*Printing Science and Imaging  
Technology*

Supervisors:

*Reinhard R. Baumann*

*Edgar Dörsam*

Defended:

*8 February 2023, Technical University  
of Darmstadt, Department of  
Mechanical Engineering, Institute  
of Printing Science and Technology  
Darmstadt, Germany*

Language:  
*German*

Original title:  
*Methode zur Analyse der  
Tropfenpositionierung im Inkjet-Druck*

Contact:  
*claus\_schneider@gmx.de*

Further reading:  
*DOI: 10.26083/tuprints-00023438*

the text discusses its process components, which include the object, lighting, optical imaging system and discretisation in the image sensor. Also, it deals with the measurement of the point spread function, reproduction of functional curves and verification of the simulation model by comparing simulated and captured images after adapting the simulation model to the camera system. The transferability of the simulation model to cameras and optics with different parameters is examined as well. The chapter dedicated to measuring drop positioning during printing describes the development of a reference sample for 1200 dpi, avoidance of interaction between rows of nozzles, line pattern for the area outside the trim and experiments on line shapes as well as monochromatic and multicoloured patterns. The next chapter focuses on detecting nozzle failure when applying the colourless primer material and using the same setup, which is possible by producing multi-layer test print samples. Finally, the duration between the occurrence and compensation of position errors is examined, and the trend of the position offset of lines is analysed to stabilise the compensation behaviour.

#### Doctoral thesis – Summary

Author:  
*Dahnan Spurling*

Speciality field:  
*Materials Science*

Supervisor:  
*Valeria Nicolosi*

Defended:  
*8 March 2023, Trinity College Dublin,  
School of Chemistry  
Dublin, Ireland*

Contact:  
*spurlida@tcd.ie*

Further reading:  
*<http://hdl.handle.net/2262/102697>*

#### Printed and Templated 3D MXene Structures for Energy Storage Applications

This thesis deals with MXenes, materials consisting of an early-transition metal (M) and carbon and/or nitrogen (X) with the general formula of  $M_{n+1}X_n$ . These materials are interesting thanks to their 2D layered atomic structure and many favourable electrical and physical properties. In particular, the work advances the recent research on 2D  $Ti_3C_2T_x$ , and its application in supercapacitors. The focus was on two main aspects: enhancing the method of  $Ti_3C_2T_x$  preparation and proposing methods for creating hierarchically structured 3D electrodes to achieve optimised performance for both micro- and macroscale electrodes.

After briefly introducing nanomaterials, MXenes, their precursors, preparation and properties, and energy storage devices, the dissertation defines the objectives and describes the techniques used for deposition and characterisation. These include additive manufacturing, aerosol-jet printing, critical point drying, electron microscopy, methods for spectroscopic characterisation, X-ray diffraction, electrochemical characterisation, and four-point probe measurements. For MXene synthesis, characterisation, and ink preparation, the text describes the synthesis and size selection of  $Ti_3C_2T_x$  using the minimally intensive layer delamination (MILD) method where  $Ti_3AlC_2$  MAX phase is etched using LiF and HCl. Physical characterisation of as-synthesised  $Ti_3C_2T_x$  dispersions and films confirmed the high quality of the prepared MXene material, and yield and conductivity were improved by freeze-thaw assisted delamination. This procedure, at first employed due to time restrictions during the pandemic, increased the mass of MXene flakes obtained by approx. 42% and also significantly improved the average diameter and conductivity of nanosheets compared to the conventionally delaminated material. To produce 3D MXene structures for micro-supercapacitors, the work employed aerosol-jet printing. The text presents the successful printing of binder-free, aqueous MXene inks to fabricate a variety of 3D structures with a high aspect ratio to increase the areal capacitance of electrodes. Finally, templated MXene thin-film 3D networks enabled the fabrication of macroscopic electrodes with improved characteristics. The templating process allowed the preparation of freestanding, thin-film MXene microtube networks with tuneable structure – on the nanoscale for high-rate areal capacitance and by compression on the microscale for high-rate volumetric capacitance – and the optimisation of electrochemical performance of the resulting electrodes.

# Events

## Printistanbul 2023 4<sup>th</sup> International Printing Technology Symposium



Istanbul, Turkey  
5–6 October 2023

In 2023, this symposium, which is otherwise held biennially, takes place after four years. The opening keynote session features four invited speakers: Nadège Reverdy-Bruas on ‘Sustainable printed and integrated electronics: from laboratory to training’, Raša Urbas, the former JPMTR Associate Editor, presenting ‘Beyond seeing: enhancing graphic technology with sensory inclusion’, Zuzanna Żołek-Tryznowska on ‘Novel, biodegradable, and green packaging materials’ and Jalel Labidi on ‘Advancement in biobased smart packaging’.

Most contributions in the following sessions deal with technology and materials, such as those with special composition, coating or other substrate treatments, their printability by different techniques, evaluation of resulting print quality and fastness, e.g. studies on rub resistance on papers produced with alternative fibre sources and photodegradation of thermochromic UV curable prints, recycling, biodegradability and waste treatment considerations, and more. Other topics include, for example, new opportunities using artificial intelligence and machine learning in the graphic arts sector, face processing techniques, evaluation of blind embossing quality based on image processing, and the role of typography in social media.

## American Printing History Association’s 48<sup>th</sup> Annual Conference



Austin, Texas, USA  
12–14 October 2023

This annual event is organised for the first time as a hybrid conference to offer the attendees the opportunity to access all keynote speakers and presentations live online. Those attending in person can join the pre-conference tours of local art centres, libraries and cultural institutions, including the exhibit ‘The Long Lives of Very Old Books’ presenting books published by Europeans between the mid-15<sup>th</sup> and late-17<sup>th</sup> centuries and tracing their stories, with more than 150 volumes on display.

The theme for this year is ‘The Printed Weird: Book History from the Margins’. The programme begins with the keynote by Sarah Horowitz, presenting the creation of her ‘Baba Yaga’ artist’s book. The papers presented in the following two days explore, among others, unusual loose type in the margins of ‘Orthographiae ratio’ (Aldus Manutius, 1564) published by Christophe Plantin, the use of printers’ ornaments in 18<sup>th</sup>-century Spanish plays, over a hundred years of collecting ephemera at the Newberry Library in Chicago, Art-Nouveau types used as text types, typographical humour of Henry Morris, a fine press printer, and creative use of page creep and page bleed. The closing keynote by Michael Winship draws on research examining the production of the first edition of ‘Leaves of Grass’ (Walt Whitman, 1855).

## FTA’s Fall Conference 2023



Louisville, Kentucky, USA  
9–11 October 2023

This year, over twenty presentations aim to show “how to do more with less” when developing the workforce at all levels, implementing expanded gamut printing, and understanding all production steps.

## Paper & Plastics Recycling Conference

Chicago, Illinois, USA  
11–12 October 2023



PAPER AND  
PLASTICS  
RECYCLING  
CONFERENCE

The topics  
discussed  
this year

include e.g. recovered paper in developing Asia, the outlook for transportation, the effect of new legislation on the supply of and demand for recycled materials, and foodservice packaging success stories. The European edition takes place on 7–8 November in Barcelona, Spain.

## WAN-IFRA Events



World Association  
of News Publishers

The main  
upcoming  
2023 events

include the World Printers Summit (Frankfurt, Germany, 11–13 October) and two Digital Media editions: for Asia in Singapore (19–20 October) and for the Middle East in Riyadh, Saudi Arabia (8–9 November).

## PRINTING United Expo 2023

Atlanta, Georgia, USA  
18–20 October 2023



Besides printing  
technologies and  
applications, this

show offers training zones, keynotes, and several co-located events.

### ERA International Gravure Days

Oberdorf, Switzerland  
18–20 October 2023



The topics of the conference held on the second day of this event include energy consumption across the entire process chain when comparing solvent- and water-based inks for printing flexible packaging, artificial intelligence in prepress, performance-based decision-making for printers and brand owners, and others.

### 3<sup>rd</sup> International Circular Packaging Conference

Ljubljana, Slovenia  
19–20 October 2023



The keynote speakers announced for this edition are Maja Desgrées du Loû, introducing a proposal for the EU packaging and packaging waste regulation, Ulrich Leberle, identifying its critical aspects for the pulp and paper industry, Julien Bras, presenting high-performance cellulose-based materials for sustainable packaging, and Nadia Lotti, discussing furan-based polymers as an alternative to non-recyclable multilayer packaging.

### Wolfram Virtual Technology Conference

<https://www.wolfram.com>  
1–3 November 2023

Among a wide range of topics, the attendees can learn about the Wolfram plugin for ChatGPT.

### Print Next 2023

Stockholm, Sweden  
30 November 2023



The topics for this edition include e.g. robotisation, the benefits of artificial intelligence to marketing and sales, and essential standards.

### RadTech Europe 2023



Munich, Germany  
17–18 October 2023

Traditionally, the European edition of this event offers two days focused on ultraviolet and electron-beam (UV/EB) curing. The opening plenary session features an EU-market overview, the awards ceremony and a keynote on future energy systems. The following conference talks fill three parallel tracks. Their topics include, among others, new process technology for advanced adhesives, thermal frontal polymerisation of epoxides, cationic ring-opening polymerisation for 3D printing of degradable polyether-esters, printing recyclable packaging using EB-curable inks, new materials, such as reactive flame retardants, disulfide-containing monomers, photo-bleachable photoinitiator for deep free-radical photopolymerisation and silicones for sustainable release coatings, advances in radiation sources and measurement methods, and regulation requirements. On the first day, the programme is complemented education sessions introducing the history, market, value chain, applications, end products, raw materials, radiation curing chemistry, formulation, curing equipment and conditions.

### CIC31 – 31<sup>st</sup> Color and Imaging Conference

Paris, France  
13–17 November 2023



Keeping the usual format, the first two days of this event are reserved for short courses and workshops, including the Appamat/IS&T International workshop on material appearance, co-located on 13 November. New courses deal with colour capture in scattering media, colour naming, material appearance measurement and characterisation, colour rendition in LED lighting and colour image analysis with deep learning. This year's conference programme features the keynotes 'Mastering light: reproduction, reality, and augmentation' by Michael J. Murdoch, 'On evaluating skin color user preferences for smartphone photography' by Sira Ferradans, and 'Colour science vs. colour engineering in high-end motion picture' by Daniele Siragusano. The papers presented in technical sessions deal, for example, with grey balance in cross-media reproductions, colour reproduction technique based on deep learning using a database of colour-converted images, and an appearance reproduction framework for printed 3D surfaces, to name a few.

### Industrial Print Integration Conference 2023



Neuss, Germany  
28–29 November 2023

The programme for the second edition of this event consists of three tracks each day. It features the keynotes on 'Advanced printed electronics in mass production of printed security features' by Philip Renners, 'The EU Green Deal & Chemicals Strategy for Sustainability: predicting the impact on the industrial printing sector' by Trevor Fielding, 'Scalable manufacturing process of perovskite solar cells by inkjet printing' by Barbara Wilk and the fourth one to be announced.